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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/652,209	08/30/2000	Yukihiro Matsumoto	4296-121 US	2302

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Mathews Collins Shepherd & Gould PA
Suite 306
100 Thanet Circle
Princeton, NJ 08540

EXAMINER

WACHTEL, ALEXIS A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 01/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/652,209

Applicant(s)

MATSUMOTO ET AL.

Examiner

Alexis Wachtel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 15-19 is/are rejected.
- 7) ☒ Claim(s) 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Detailed Action

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 6,7,12 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With respects to claims 6,7 and 18, Applicant does not explain what is meant by the phrase: "wherein a difference in the number of reaction tubes configured in the regions of reaction tubes divided by at least two circulation passages is within 3%".

Claim 12 recites the limitation "the gas". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set

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forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5,8-11,15-17,19 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 5,821,390 to Ruppel et al.

Ruppel et al discloses a reactor as claimed per claim 1: A shell-and-tube type reactor (Fig.1) comprising: a cylindrical shell (Fig.1) having disposed on the periphery thereof a plurality of annular conduits (12,13) for guiding a heating medium in or out in the radial direction and having a raw material inlet (11) and a product outlet (10); a circulation device (Col 6, lines 3-7) for mutually connecting a plurality of annular conduits; a plurality of reaction tubes (2) constrained to the reactor by a plurality of tube sheets (3,4); donut type baffle plates (7) and disc type baffle plates (8) disposed in the longitudinal direction of the reaction tubes and adapted to vary the direction of the heating medium introduced into the shell; an empty space devoid of a configuration of the reaction tubes at a center of the shell (Col 5, lines 45-47); and reaction tubes (2) unsupported by the donut type baffle plate in the center hole side.

Ruppel et al fails to teach that the reaction tubes are restrained at center distanced 1.2 to 1.4 times the outside diameter of the reaction tube. However, too great of a distance between reaction tubes will necessitate the need for a larger reactor to use the same number of tubes whereas too close of a distance between tubes would serve to restrict the flow of heat exchanger fluid between tubes. Accordingly, it would have been obvious to one of ordinary skill in the art to have placed the reaction tubes at the

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claimed restrained distances as determined through the process of routine experimentation.

Per claim 2: further comprising reaction tubes not supported by the disc type baffle plates (2).

Per claim 4: further comprising at least one circulation passage for the heating medium between an empty space devoid of a configuration of reaction tubes in the center of the shell and the peripheral part of the shell. Examiner notes that the central portion of the reactor and periphery has empty space through which heating fluid circulates.

Per claims 8: wherein a cross-sectional area of the circulation passage is in the range of 0.5 - 5% based on the cross-sectional area of the shell. Too great of a cross sectional area for the circulation passage will result with a lack of turbulent flow necessary for maintaining heat homogeneity in the heat exchanger fluid, whereas too little of a cross-sectional area for the circulation passage will result with poor heat removal. Accordingly, it would have been obvious to one of ordinary skill in the art to have used the claimed cross sectional area for the circulation passage as determined through the process of routine experimentation.

Per claims 9: further comprising at least one circulation passage for the heating medium between an empty space devoid of a configuration of reaction tubes in the center of the shell and the peripheral part of the shell. Examiner notes that the central portion of the reactor and periphery has empty space through which heating fluid circulates.

Per claim 11: further comprising at least two of circulation conduits for supplying or withdrawing the heating medium to or from the shell (Col 6, lines 3-7).

Per claim 15: further comprising two chambers along with the direction of a raw material gas inlet to a product outlet. The Examiner notes that a plurality of alternating donut and disk baffles define a plurality of open chambers.

Per claim 16: further comprising at least one circulation passage for the heating medium between an empty space devoid of a configuration of reaction tubes in the center of the shell and the peripheral part of the shell. Examiner notes that the central portion of the reactor and periphery has empty space through which heating fluid circulates.

Per claims 3,5,10,17: Ruppel fails to teach that the cross sectional area of the empty space is in the range of 0.5 - 5% of the cross sectional area of the shell; the a cross sectional area of the disc type baffle plates in the range of 50 - 95% of the cross sectional area of the shell; the cross sectional area of holes in the donut type baffle plates in the range of 2 - 25% of the cross sectional area of the shell. Too great of a cross sectional area for an empty space will result with wasted space within the reactor whereas too little of an empty cross-sectional area will result with poor heat removal. Accordingly, it would have been obvious to one of ordinary skill in the art to have used the claimed cross sectional area for the empty space as determined through the process of routine experimentation. Too great of a cross sectional area for disc type baffle plate will result with decreased heat removal as a result of fluid flow restriction, too little of an empty cross-sectional area will result with poor heat exchange fluid

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mixing that will result with heat gradients. Accordingly, it would have been obvious to one of ordinary skill in the art to have used the claimed cross sectional area for disc type baffle plate as determined through the process of routine experimentation. Too great of a cross sectional area for cross sectional area of holes in the donut type baffle plates will result with poor heat exchange fluid mixing that will result with heat gradients, too little of an empty cross-sectional area will result with decreased heat removal as a result of fluid flow restriction.

In the alternative, per claims 1-5,8-11,15-17, as best seen in Fig of Ruppel et al, the claimed configurational parameters are inherent to the apparatus shown by the Fig.

Per claims 19: A method for the production of methacrylic acid and/or methacrolein by means of catalytic gas phase oxidation using a reactor (Col 1, lines 5-15).

Prior Art of Record

5. The prior art of record and not relied upon is considered pertinent to Applicant's disclosure. In addition, the following references are cited for disclosing various aspects of Applicant's invention:

US 3,871,445
US 4,256,783
US 5,277,247
US 5,149,884
US 4,203,906

Allowable Subject Matter

6. Claims 12-14 are objected to as depending off a rejected base claim but would be allowed if rewritten in an independent form. Claim 12 would be allowed if rewritten to

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overcome the 112 2nd paragraph rejection as well as rewritten in independent form. The following contains a statement for indicating allowable subject matter. No prior art has been found to teach or suggest per claim 12 a gas discharge conduit discharging the gas accumulated in the shell. (has to be in addition to product gas outlet); 112 2nd par, LAB. The closest prior art to Ruppel teaches the use of a singular product outlet that cannot simultaneously function as a gas discharge outlet for discharging gas accumulated in the shell of the reactor. Additionally, Ruppel fails to show that any operational problems exist due to accumulated gas in the reactor shell. Accordingly, one of ordinary skill would have no motivation for providing a gas discharge conduit as claimed in claim 12.

No prior art has been found to teach or suggest per claim 13 that the circulation conduit has a plurality of opening rows for allowing the heating medium to pass, an width B of the opening being in the range of 5 to 50% based on the center distance, and a ratio of opening length C/opening width B being in the range of 0.2 to 20. 14. While Ruppel et al does teach the use of a circulation conduit, no prior art has been found to remedy its deficiencies. In particular, Ruppel et al teaches the use of a simple circulation conduit for providing and removing heat exchanger fluid to the reactor. No problems with Ruppel et al's circulation are disclosed. It is the opinion of the Examiner that the additional structure communicated by claim 13 would un-necessarily complicate the existing circulation conduit(s) taught by Ruppel et al. Accordingly, having modified the structure of the circulation conduits disclosed by Ruppel et al would be a movement away from the teachings of Ruppel et al since a more complicated and expensive

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apparatus would result. Accordingly, it would not have been obvious to one of ordinary skill to have remedied Ruppel et al's deficiencies per claim 13 without relying on hindsight.

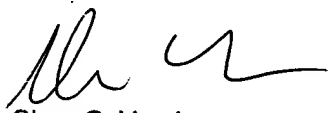
Claim 14 is allowable subject matter for depending on claim 13.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Alex Wachtel, whose number is (703)-306-0320. The Examiner can normally be reached Mondays-Fridays from 10:30am to 6:30pm.

If attempts to reach the Examiner by telephone are unsuccessful and the matter is urgent, the Examiner's supervisor, Mr. Glenn Caldarola can be reached at (703) 308-6824. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Glenn Caldarola
Supervisory Patent Examiner
Technology Center 1700